

Title: Bar Graph Kit

Link to Outcomes:

- **Problem Solving** Students will ask questions, form hypotheses, collect information and use graphs to organize and display the information collected.
- **Communication** Students will use graphs to communicate about collected data.
- **Reasoning** Students will apply reasoning processes to test hypotheses and form conclusions.
- **Connections** Students will connect graphing with scientific method. Students will practice forming questions that will sort responses into two categories. Students will use artistic ability to personalize graph kits. Students will use graph kits in subsequent math, science, and language arts lessons.
- **Number Sense & Numeration** Students will represent numerical relationships using graphs.
- **Whole Number Computation** Students will use mental computation and estimation techniques.
- **Statistics & Probability** Students will interpret and describe information obtained from graphs.
- **Patterns and Relationships** Students will represent and describe mathematical relationships.

Brief Overview:

Students will make shoe boxes into personal felt boards with manipulatives. The graph kit is useful in a variety of activities related to language arts, science, art, and math. In this unit, students are introduced to bar graphs. They use felt boards and squares to construct graphs related to data they collect. When clean-up time comes, the students stack the kits in one of two piles in response to the “Question of the Day.” These piles then become a bar graph of responses for the whole class. This lesson works best with groups of eight or more.

Grade/Level:

Grades 1- 6

Duration/Length:

This activity should take three to four 40 minute class periods. Maintenance and practice may continue as appropriate using the “question of the day” format.

Prerequisite Knowledge:

- Ordering numbers to 100
- Classifying and separating sets
- Understanding of 1:1 correspondence using tallies to count events or objects
- Comparing quantities: more than, less than, same
- Formulating questions that sort responses into two categories.

Objectives:

The students will:

- make a bar graph from data they collect.
- interpret data presented on a bar graph.
- support a conclusion about hypotheses by referring to a bar graph of the data.

Materials/Resources/Printed Materials:

- One shoe box per person
- One felt rectangle with x and y axes (L-shaped line) marked on left and bottom sides
- 20 small felt squares per person: two colors, ten each (graph units)
- Decorative materials -- construction paper, stickers, etc. for personalizing boxes
- Bulletin board covered with felt for Graph Center
- Pictures or labels of response categories for Graph Center
- Data Worksheets
- Glue, scissors, markers
- Shoe box for Guess Box

Development/Procedures:

Day One: Students will construct the graph kits and answer a question that sorts responses into two categories.

- Tell students that this activity will help them get to know each other by asking questions.
- Hand out shoe boxes and felt rectangles marked with x and y axes. Have students glue the rectangles to the lids of the shoe boxes

- Allow students time to personalize the outside of the boxes.
- Ask students to print their names on one end of the shoe box.
- Ask students to consider their answer to “The Question of the Day”, for example, “Which do you like better, pizza or ice cream?” Tell them to draw a circle around their name if they prefer pizza and a rectangle if they prefer ice cream.
- Have students clean up and stack the boxes in a designated area.

Note: Prior to Day Two:

1. Cover one bulletin board in felt marked with x and y axes. Position one picture of each response category along the x axis. Place a question such as : “Which did you like better?” Along the top of the bulletin board. This will be the graph center.
2. Place the 20 felt squares of the two different colors in students’ graph boxes.

Day Two: Students use a graph to answer a question that sorts responses into two categories. They formulate questions of this type and hypothesize which categories will have a greater response.

- Ask students to retrieve the graph boxes as they enter the classroom and place the boxes either beneath the picture of the pizza or beneath the picture of the ice cream , depending on the preference they had indicated on their boxes.
- Direct students’ attention to the graph center. Ask questions such as: “ What did most students in the class like best, pizza or ice cream?” “ How do you know?” Discuss how the graph represents student responses.
- Divide students into groups of 4 to 6. Ask students several questions that sort responses into two categories, such as: “Which do you prefer, cats or dogs?” or “Which movie do you like best, *Pocahantas* or *the Lion King*?” Select one student from each group to record responses. Have students graph the groups’ responses using the individual graph kits. Make sure all students understand that one felt square represents one student response.
- Have the class practice formulating questions that sort responses into two categories. Pass out data worksheets (see sample).

- Ask students (working in groups) to prepare one question that sorts responses into two categories. Students should write the question agreed upon on their data sheet and make a prediction as to which category will receive the greatest number of positive responses.
- Have students collect 10 responses during class or for homework.
- Ask students the “Question of the Day”. Direct them to indicate their response by placing their graph box under the appropriate picture or label at the graph center as they leave the classroom.

Note: Prior to Day Three:

1. Students should make a hypothesis as to the most popular response to the “Question of the Day” and place it in the “Guess Box” as they leave the classroom.
2. Cover the stacked graph boxes with a sheet.
3. Sort hypotheses and post them as a graph on the Graph Center board.

Day Three: Students will estimate the results of collected data by looking at the shape of a three-dimensional graph. They will compare hypothesized data to actual data, discuss reasons for differences, and come to a conclusion.

- Ask students to estimate the results of the “Question of the Day” by looking at the covered graph boxes. Tell students that whoever has the closest estimate will receive a treat. Compare estimates with actual results. Discuss.
- Compare students’ hypotheses graphed on the Graph Center board to actual data (stacked graph boxes). Discuss.
- Direct students to take their worksheets and return to their groups. Tell each student to use the graph kit to graph the data collected and compare the graphs with those of other group members .
- Ask students in each group to combine the data responses and make a graph to represent the results. Discuss how and why results differed from hypotheses. Have each member of the group complete the worksheet by writing a conclusion as to whether the hypothesis was correct.

Evaluation:

Students can be evaluated based on the following criteria:

- Group participation and performance: Check daily for individual participation and on-task behavior.
- Correspondence of graph to data
- Completion of worksheet

Extension/Follow Up:

As a language arts extension, have students use their graph kits as story boards. They can use felt characters and objects to retell a story, or to illustrate an original story.

A possible science extension would be for students to develop experiments that include variables. Data would be reported using a variety of graphs.

Other math manipulative such as tangrams, pie graphs, fraction shapes, etc. can be made for the graph kit.

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Data Worksheet

Name _____

Be a Detective

Introduction: Detectives search for answers to questions. To be sure they have the right answer, they must ask questions. The information collected must be organized in a way that tells a detective the answer. You must have something you want to know about your new classmates. Use the detective's method to find out!

Instruction: Fill in the blanks.

1. My question for my friends is:

Do you like _____ or _____?

2. I hypothesize that _____ will be the more popular choice.

3. The answers I got were:

Name	Choice 1: _____	Choice 2: _____
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	Total number _____	Total number _____

STOP! Make a bar graph using your data! Save it for the teacher to check.

Name_____

Follow up Questions

1. Use your graph to help you write a complete sentence explaining if your hypothesis was proven true or false.

2. What did you learn about your friends?
